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CASE REPORT

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Closed mallet thumb injury treated surgically: a case report

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ABSTRACT

In this report a case of closed mallet thumb injury is described, which was diagnosed clinically and indication for surgical treatment was confirmed with ultrasound examination. The EPL-tendon was successfully reconstructed with an excellent result. We propose a mandatory ultrasound examination of all closed mallet thumb injuries.

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Closed mallet thumb; EPL rupture; ultrasound examination; avulsion

Introduction

Closed mallet thumb injury without phalangeal fractures is extremely rare. According to Doyle's classification of mallet finger injuries, the closed terminal EPL tendon rupture is ranged in Type I [1]. In 1983 Din and Meggitt recommended the surgical treatment of this injury for the first time [2].

Afterwards, several authors described successful conservative treatments using splinting of the interphalangeal joint of the thumb in extension in 1986 [3–6]. In the current literature only 36 reported cases exist, which leads to a present lack of information for a standardised treatment. Recently, Abe et al. published the first systematic literature review in this field and compared their case series of 10 patients with 26 comparable previously reported cases. They found no significant difference between conservative and surgical treatment on the final result, but surgery may lead to a more rapid recovery based on earlier mobilisation [7]. We present one case of closed mallet thumb injury where surgery was crucial.

Case report

A 28-year-old Caucasian female applied to our emergency department immediately after sustaining a hyperflexion trauma of her right dominant thumb. She reported that a horse-rein wrapped her thumb while the animal severely pulled the interphalangeal (IP) joint multiple times in various directions. Apart from that, the patient was healthy, a non-smoker and had no history of previous hand injuries.

Physical examination revealed an intact integument of the injured right thumb, the IP-joint in approximately 30° flexion and strong local pain. Closer functional testing showed a distinctive inability of active extension and maintenance of full extension of the IP-joint when achieved passively. This joint was otherwise stable without clinical signs for fractures. The metacarpophalangeal (MCP) joint of the affected thumb was compromised in its physiological range of motion (ROM) due to the pain but unharmed. No other combined injuries were observed. Therefore, clinical diagnosis of closed rupture of the extensor pollicis longus (EPL) tendon was set.

Plain X-rays confirmed our findings in the physical examination showing no osseous defects (Figure 1). Ultrasound examination was performed immediately at the emergency department to confirm the clinical diagnosis of closed mallet thumb injury and to assess if a surgical procedure is indicated. It showed a considerable gap of 17 mm between the torn ends of the EPL tendon according to an avulsion of the proximal stump (Figure 2). Therefore, the indication for a surgical repair was given. In wide awake anaesthesia a dorsal incision centred on the IP joint (H-shaped) was performed. Surgical site presented a complete avulsion of the EPL tendon with a remarkable gap (Figure 3(A)). Surgical reconstruction by anatomical reinsertion of

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Figure 1. Preoperative X-rays of the injured right thumb revealing no fractures. (A) Posteroranterior view; (B) lateral view.

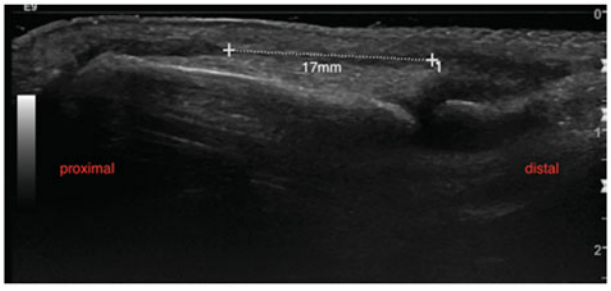

Figure 2. Preoperative sonography of the injured right thumb revealing an avulsion of the EPL tendon with a gap of 17 mm in full extension.

the tendon was required. As the rupture was at the outermost distal end of the tendon a suture was not possible. In consequence, the torn structure was reinserted anatomically using a Mini QUICKANCHOR® suture anchor (USP 2/0; Mitek-DePuy Synthes, Raynham, MA). Additionally, the IP-joint was transfixed with a Kirschner wire (1.25 mm) in full extension to ensure immobilisation during the initial healing process.

The postoperative recovery was uneventful. Hand-physiotherapy was started immediately with initially forceless mobilisation until the percutaneous pin was removed three weeks after surgery. Under the guidance of experienced hand therapists, active

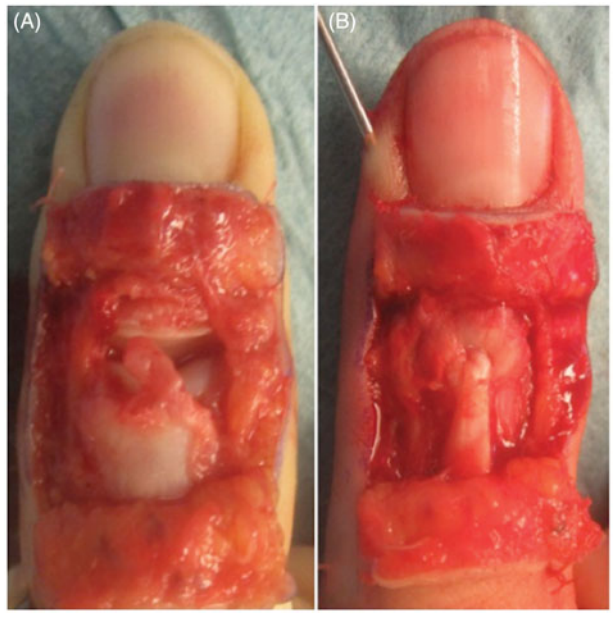

Figure 3. Intraoperative photo documentation. (A) Total rupture of the EPL close to the distal insertion; (B) Fixation of the EPL tendon with the Mini QUICKANCHOR® suture anchor and transfixation of the IP-joint with Kirschner-wire (1.25 mm).

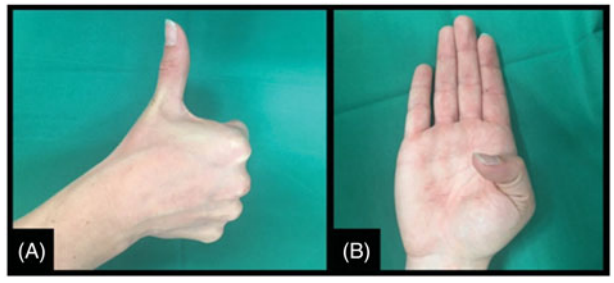

Figure 4. Clinical outcome 1 year after surgery. (A) In full active extension; (B) in maximal active flection.

mobilisation and increased weight bearing followed. Eight weeks after surgery full mobilisation and unrestricted weight bearing was established. Early mobilisation after trauma is necessary to maintain and restore the function of the joint and avoid adherences.

One year after surgery the patient obtained a ROM of 0/0/65° of the right IP-joint compared to 5/0/70° of the contralateral thumb (Figure 4(A,B)). The right thumb presented a normal Kapandji-score of 9 and the key pinch strength of 7 Kg compared to 11 Kg of the contralateral side.

Discussion

Acute closed mallet thumb injuries are rare compared to mallet finger injuries. This resulted in a shortage of evidence and still little guidance for the diagnosis and treatment of closed mallet thumb injuries.

Patients, like the one described in our case report, are unlikely to regain adequate function with conservative treatment alone. Surgical intervention is further beneficial for preserving the function of the hand due to early mobilisation [7]. It is important to recognise indications for surgery such as the avulsion of the EPL tendon presented in our case, when X-rays reveal no osseous defects. Probably, such misguided treatment is supported by the successfully conservative treated cases of mallet thumb injury described in the literature.

This case report proofs that decision for a surgical or conservative treatment of a closed mallet thumb injury has to be taken more differentiated. In our opinion sonography should be mandatory in the diagnosis of all closed tendon ruptures without bony lesions, especially of the thumb. This cost-effective tool is easy and quick to perform and provides reliable information to identify those cases that will fail healing without surgical intervention. Magnet resonance imaging would be an alternative as suggested by Tabbal et al. as well as Lee et al. in their case but availability and costs are major disadvantages of this method [8,9].

In conclusion, we propose that ultrasound examination should become mandatory to identify all cases of closed mallet thumb injuries that require surgical treatment, especially in an emergency setting and acute injuries. A standardised treatment protocol for diagnostic methods and treatment regimen is needed for closed mallet thumb injuries, taking the tendon gap into account.

Disclosure statement

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